

INTERMOUNTAIN POWER SERVICE CORPORATION

B1921

File: 01.03.01
IGS91-3

Express
1/27
MR

January 23, 1992

Bruce E. Blowey
Engineer of Generation
Los Angeles Department of Water & Power
P.O. Box 111, Rm. 1255E
Los Angeles, CA 90051

Dear Mr. Blowey:

Unit 1 Burner Modification Purchase Requisitions

Attached are purchase requisitions and documentation associated with the Unit 1 burner modifications to be implemented during the Spring 1992 Outage, scheduled to begin April 13, 1992. These alterations to the burners include the following requisitions:

1. Requisition 66498 - Fabrication of burner flame stabilizers. Cost of the flame stabilizers is \$2,100 per burner, for a total cost for 48 burners of \$100,800.
2. Requisition 66500 - Installation of the flame stabilizers, outer air register shrouding and coal burner line restrictors by an outside contractor. Total estimated cost for this installation is \$125,000.
3. Requisition 66499 - RJM technical support on secondary air flow testing and balancing. RJM will provide the test equipment, software, and diagnostics support. Total estimated cost for the testing and balancing is \$70,400.

Total cost of these purchase requisitions is \$296,200 which will be funded from monies appropriated under IGS91-3, IPSC Budget page 8, line 4.

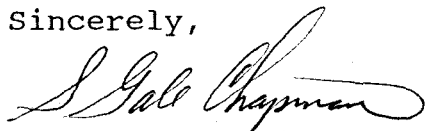
For book attachment see Tech
Services Library Book # 2969
- PF -

Mr. Bruce E. Blowey
Page 2
January 23, 1992

Your review and approval will be appreciated. Please return by February 17, 1992.

If there are any questions regarding this request, please contact Aaron Nissen or Jerry Hintze.

Sincerely,



S. Gale Chapman
President and Chief Operations Officer

~~104~~
LBL:kkc
Attachments

cc: S. Gale Chapman w/o Attachments
Doug Ingraham w/o Attachments
Aaron Nissen w/o Attachments
Jerry Hintze w/o Attachments
Les Lovell w/o Attachments
File

IP7_000474

[] REQUISITION FOR CAPITAL EQUIPMENT

[X] PURCHASE AUTHORIZATION FOR EXPENSE ITEMS

Purpose of Materials, Supplies or Services: Burner

flame stabilizer fabrication for IGS Unit 1 for the

Spring Outage 1992.

Suggested Vendor: RJM Corporation
Attn: Richard Monroe
Ten Roberts Lane
Ridgefield, CT 06877
(203) 438-6198

Account No. IGS91-3
ISGx-402

Date	<u>1/15/92</u>
Req./PA No	<u>66498</u>
P.O. No	<u></u>
Vendor	<u></u>
Terms	<u></u>
FOB	<u></u>
Terms	<u></u>
Ship Via	<u></u>
Conf. To:	<u></u>

Qty	Unit	Description			Seller or Manufacturer	Unit Cost	Extension
		Noun	Adjective	Catalog #			
48		Burner Flame Stabilizers				2100	\$100,800
		Reference attached Specifications, Drawing and					
		RJM Price Summary.					
1		Travel for meetings (expenses plus per diem)					\$2,500
		as requested by IPSC.					
		IPSC's contact and interface person with RJM shall					
		be Richard Monroe.					
		Delivery of 1/2 of the stabilizers (12 CCW, 12 CW)					
		shall be by March 30, 1992 and the other 1/2 by					
		April 6, 1992.					
		Same terms and conditions as the Burner Design					
		Evaluation Contract.					
		TOTAL ESTIMATED COST					\$103,300.

Remarks: Please contact Aaron Nissen (6482) with any questions.

Delivery requested by [Date] 3/30/92 Originator Aaron Nissen

JKH 1/22/92 1-22-92
Dept. Mgr/Supt. Date Station Manager Date Operating Agent Date

INTERMOUNTAIN POWER SERVICE CORPORATION Form IPSC 9A

IP7_000475

INTERMOUNTAIN POWER SERVICE CORPORATION

SPECIFICATIONS: BURNER FLAME STABILIZERS

Unit 1 Outage (April 1992)

1.0 SCOPE OF WORK

1.1 RJM Corporation shall provide 48 MZ Flame Stabilizers suitable for attachment to the Intermountain Generating Station, Unit 1, newly designed Babcock and Wilcox dual register low NOx burners.

1.2 RJM shall provide technical assistance and instructions for stabilizer installation during the Spring Unit 1 Outage which begins April 13, 1992.

1.3 Installation of the stabilizers will be provided by others.

1.4 Testing to verify specification compliance will be by others. Testing to verify specification compliance shall be witnessed by an authorized representative of RJM.

2.0 PERFORMANCE SPECIFICATIONS

2.1 The stabilizers shall be designed with 24 having clockwise inner air rotation and 24 having counter-clockwise inner air rotation.

2.2 Dimensional tolerances shall be as large as possible to allow for warping and deformation of the burners during normal operation.

2.3 The stabilizers shall be designed to allow for replacement of the coal nozzle without removing the stabilizer.

2.4 The stabilizers shall be designed to handle the temperatures and conditions that are present at the existing burners. No structural damage, warpage or deformation of the stabilizers shall occur that impedes the operation of the stabilizer under normal operating conditions.

2.5 The stabilizers shall not interfere with the coal and

primary air flow from the burner nozzles.

2.6 The stabilizers shall have factory installed provisions for the lighter shrouds, scanner and sight tube. The structural design of the stabilizer vanes shall include these openings. IPSC will provide the location and size of the openings.

2.7 The performance of Unit 2, after the installation of these stabilizers, shall meet or exceed the following requirements:

- a. NOx emission levels shall be at or below 0.44 lbs/Mbtu.
- b. Excess oxygen levels shall be at or below 3.2% with ranges (maximum to minimum) of 1.5%.
- c. CO levels shall be at or below 150 ppm with ranges (maximum to minimum) of less than 75 ppm.
- d. Loss on Ignition of the ash shall be less than 1.0% (with 70% coal passing thru 200 mesh screen).

Requirements (a), (b) and (c) will be measured at the economizer outlet using a 56 point measurement grid.

Requirement (d) will be determined from representative samples removed from the baghouse hoppers.

All of the above requirements shall only apply if air and fuel flows are balanced within plus or minus 5% of the mean values for all burners.

2.8 The post-installation performance tests will be conducted by either IPSC or a third party contractor according to procedures agreed to by both RJM and IPSC. This test will be completed within 90 days after the start-up of the Unit with the stabilizers.

3.0 CONDITIONS

3.1 Detailed drawings of the stabilizers shall be submitted three weeks prior to delivery. The drawings shall include all details necessary for installation.

3.2 Should any equipment prove defective within one year after shipment due to faulty material or improper workmanship, RJM

shall, without charge to IPSC, repair or replace the defective parts upon return of said defective part or parts to RJM. RJM shall not be responsible for any costs for removing or reinstalling said parts.

The foregoing shall not apply to equipment that has been altered or repaired after shipment to IPSC or to IPSC's agent, by anyone except RJM's authorized employees, and RJM shall not be liable in any event for alterations or repairs except those made with RJM's written consent. The guarantee shall not cover ordinary wear, erosion, corrosion or damage due to overheating or improper handling or storage after shipment to IPSC.

3.3 In the event of stabilizer performance failure as defined below, RJM shall, upon written request from IPSC, within 30 days, refund the purchase price of all (48) stabilizers, excluding costs for engineering. RJM shall not be liable for any special or consequential damages that might occur as the result of stabilizer performance failure as defined below and RJM's liability for such failure shall be limited to the contract price of the stabilizers.

Stabilizer performance failure shall be defined as the occurrence of either or both of the following events:

- a. If more than six stabilizers are thermally damaged thru warpage, deformation or deterioration, or plug with ash or slag, such that they fail to perform their intended function within one year of installation provided burners are set, operated and maintained to RJM requirements. If this failure occurs, IPSC will allow RJM to investigate to determine the cause and to verify compliance with operating and maintenance requirements.
- b. If Unit 1 fails to meet any of the performance conditions as outlined in Article 2.7 and as determined during the post-installation testing as per Article 2.8. If IPSC fails to perform the performance tests within the time frame allowed in Article 2.8, then the stabilizers will be deemed to have met the performance requirements of Article 2.7.

3.4 One half of the stabilizers, 12 CCW and 12 CW, shall be delivered to the Intermountain Power Project site by no later than March 30, 1992 for attachment to the burners and remaining half delivered by April 6, 1992.

☒ REQUISITION FOR CAPITAL EQUIPMENT
☐ PURCHASE AUTHORIZATION FOR EXPENSE ITEMS

Date 01/17/91
 Req./PA No 66500
 P.O. No
 Vendor
 Terms
 FOB
 Ship Via
 Conf. To:

Purpose of Materials, Supplies or Services: Installation of
Flame Stabilizers, Coal Line Restrictors and Outer Air Register
Shrouds on Unit 2 during the Spring 1992 Outage.

Recommended Bidders:

- Townsend & Bottum
- Babcock & Wilcox

Account No. 156X-~~A~~ 502
 Work Order No. IGS #91-3
91-89200-00

Qty	Unit	Description Noun Adjective Catalog #	Seller or Manufacturer	Unit Cost	Extension
1	job	Services & construction for installation of burner system components			
		and miscellaneous burner assembly as described in the attached scope			
		of work. Site walk-down required of all bidders prior to submittal.			
TOTAL ESTIMATED COST				Not to Exceed \$125,000.	

Remarks: See Cecil James Extension 6438 or Jim Nelson Ext 6464 with questions.

Delivery requested by [Date] 4/06/92 Originator James H. Nelson

SA [Signature] for DKK 1/22/92 [Signature] 1-22-92
 Dept. Mgr/Supt. Date Station Manager Date Operating Agent Date

INTERMOUNTAIN POWER SERVICE CORPORATION

Form IPSC 9A

IP7_000479

INTERMOUNTAIN POWER SERVICE CORPORATION

**SPECIFICATIONS: INSTALLATION OF FLAME STABILIZERS, REGISTER
SHROUDING AND COAL LINE RESTRICTORS**

Unit 1 Outage (April 1992)

1.0 GENERAL

1.1 Contractor shall provide all equipment, labor, supervision, services, transportation, tools and miscellaneous consumable materials for complete installation of all work as described herein.

1.2 Questions regarding work priority and completion requirements shall be referred to the IPSC contract administrator for resolution. All tools and material not provided by IPSC, as itemized within these specifications, shall be provided by the Contractor.

2.0 SCOPE OF WORK

2.1 IPSC shall provide, install and operate two boiler platforms for access to boiler internals on both the front and rear walls. Access to and use of these platforms shall be on a priority or first-come basis. Priority work to be determined by IPSC. An estimated outage schedule will be provided by IPSC prior to bid submittal.

2.2 The Contractor shall provide sufficient manpower, trained in B&W boiler/burner maintenance, to complete the following work in accordance with the attached schedule:

2.A BURNER LINE RESTRICTORS

2.A.1 Contractor shall changeout 18 burner line restrictors per the attached schedule. The Contractor shall provide all necessary rigging, scaffolding, and tools. Spools, sleeves, flanges and bolts shall be provided by IPSC.

2.A.2 Contractor shall install three restrictor spools on A1, H3, and C4 by:
- install necessary access scaffolding
- brace and cut the burner line

- align and weld flanges on the burner line ends
- install restrictor spool

2.A.3 Changeout 11 restrictor spools on:

B1, F4, F5, D2, D4, H4, C2, C3, G4, G5, and G6 by:

- install necessary access scaffolding
- brace the burner line
- install new restrictor spool assuring the burner line flange bolt holes align with the spool holes

2.A.4 The Contractor shall modify the restrictors on:

E3, E4, E5, and E6 by:

- install necessary access scaffolding
- brace burner line
- remove spool and replace sleeve
- re-install spool

2.B STABILIZERS

2.B.1 As directed by IPSC, the contractor shall install one impellar-type vane assembly (stabilizer) on all 48 Unit 1 burners prior to the outage. Stabilizers will be provided by IPSC. Installation of the stabilizers shall consist of the following:

2.B.2 Attachment of stabilizer stand-offs to the ID of the inner air sleeve of each burner. Attachment weld rod shall be 310 stainless steel. (see attached sketch)

2.B.3 Field adjustment (trimming) of the stabilizer perforations to ensure proper operation of the lighters, scanners and observation ports.

2.C BURNER REGISTER SHROUDS

2.C.1 Contractor shall install outer air register shrouds on all Unit 1 burners per the attached drawings. The shrouds shall be mechanically fastened to the rear outer register plate frame in a position providing a 5.875 inch air flow annulus at the outer register.

2.C.2 Completion of shrouds is to coincide directly with completion of new burner installation by Babcock & Wilcox. Shrouds shall be provided, ready to install, by IPSC.

2.D FINAL BURNER ASSEMBLY

D.1 Contractor shall install new mounting clips and diffusers in all 48 Unit 1 burners upon completion of air flow testing by IPSC.

D.2 Contractor shall re-install all burner elbows.

3.0 JOB CHARGES

3.1 Contractor shall provide a schedule of rates for each craft as well as subtotal estimates for each task described herein.

RESTRICTOR CHANGEOUT SCHEDULE

Front Wall:

B1 Change sleeve from Sch. 40 to Sch. 60
B2 No change
B3 No change
B4 No change
B5 No change
B6 No change

F1 No change
F2 No change
F3 No change
F4 Change sleeve from Sch. 60 to Sch. 40
F5 Change sleeve from Sch. 120 to Sch. 100
F6 No change

A1 Install new restrictor with Sch. 30 sleeve
A2 No change
A3 No change
A4 No change
A5 No change
A6 No change

E1 No change
E2 No change
E3 Remove Sch. 30 sleeve
E4 Remove Sch. 30 sleeve
E5 Remove Sch. 30 sleeve
E6 Remove Sch. 30 sleeve

Rear Wall:

G1 No change
G2 No change
G3 No change
G4 Change sleeve from Sch. 60 to Sch. 80
G5 Change sleeve from Sch. 60 to Sch. 40
G6 Change sleeve from Sch. 60 to Sch. 80

C1 No change
C2 Change sleeve from Sch. 40 to Sch. 60
C3 Change sleeve from Sch. 40 to Sch. 60
C4 Install new restrictor with Sch. 30 sleeve
C5 No change
C6 No change

H1 No change
H2 No change
H3 Install new restrictor with Sch. 30 sleeve
H4 Change sleeve from Sch. 60 to Sch. 80
H5 No change
H6 No change

D1 No change
D2 Change sleeve from Sch. 60 to Sch. 80
D3 No change
D4 Change sleeve from Sch. 60 to Sch. 40
D5 No change
D6 No change

[] REQUISITION FOR CAPITAL EQUIPMENT

[X] PURCHASE AUTHORIZATION FOR EXPENSE ITEMS

Purpose of Materials, Supplies or Services: Burner

air flow testing, diagnostics and balancing of the

outer and inner air registers during Unit 1's Spring

1992 Outage.

Suggested Vendor: **RJM Corporation**
Attn: Richard Monroe
Ten Roberts Lane
Ridgefield, CT 06877
(203) 438-6198
FAX (203) 431-8255

Account No. IGS91-3
156X-502

Date	<u>1/16/92</u>
Req./PA No	<u>66499</u>
P.O. No	<u></u>
Vendor	<u></u>
Terms	<u></u>
FOB	<u></u>
Terms	<u></u>
Ship Via	<u></u>
Conf. To:	<u></u>

Qty	Unit	Description	Cost	Extension
1		Burner Air Flow Analysis on IGS Unit 1 during		\$ 34,300
		the Spring 1992 Outage which begins 4/13/92.		
112	ea	Burner Air Flow Balancing & Retesting on an "as	\$300	\$ 33,600
		needed" basis to meet perf criteria & time requir		
		Reference attached Specifications and RJM		
		Proposal for contract details.		
		Same terms and conditions as the Burner Design		
		Evaluation Contract.		
		IPSC's contact and interface person with RJM shall		
		be Mr. Richard Monroe.		
1		Travel for meetings (expenses plus per diem)		\$2,500
		as requested by IPSC.		
		TOTAL ESTIMATED COST		\$70,400.

Remarks: Please contact Jerry Hintze or Aaron Nissen with any questions.

Delivery requested by [Date] 5/07/92 Originator Aaron Nissen
[Signature] 1-22-92
Dept. Mgr/Supt. Date Station Manager Date Operating Agent Date

INTERMOUNTAIN POWER SERVICE CORPORATION Form IPSC 9A

IP7_000485

INTERMOUNTAIN POWER SERVICE CORPORATION

SPECIFICATIONS: BURNER AIR FLOW TESTING AND BALANCING

Unit 1 Outage (April 1992)

1.0 SCOPE OF WORK

1.1 The Contractor shall provide testing and diagnostic services to balance secondary air flow to individual burners on a burner row basis. Both the inner (spin) and outer air zones shall be tested, balanced and retested to verify acceptance criteria.

Intermountain Generating Station, Unit 1, will be made available at the end of its Spring Outage for testing and balancing purposes. Unit 1's Outage begins April 13, 1992 and a block of four days are tentatively scheduled for testing and balancing activities (reference attached schedule).

1.2 The Contractor shall provide technical support and manpower for two test crews to conduct simultaneous air flow testing.

IPSC will provide technical support for the test crews of one person per crew.

Outage time is of the essence. To be able to conduct the testing, balancing and retesting, multiple crews and shifts will be utilized to obtain desired results. A window of four days is being provided during the Outage to complete all testing and balancing activities.

Work shifts maybe scheduled day or night and of ten to twelve hour duration to accommodate outage and testing activities. IPSC will pay premium time beyond an eight hour shift.

1.3 The Contractor shall provide a minimum of three sets (with one in standby) of test probes and analyzers for conducting the burner air flow balancing. Spare parts, probe and analyzer shall be obtainable within one working day (overnight freight service), upon the event of equipment failure.

1.4 IPSC will provide brackets or jigs for insertion in the coal nozzles to accommodate the test probe assemblies. A minimum of twelve jigs will be provided.

Maintenance support will be provided by IPSC to move the jigs during the air flow testing.

1.5 IPSC will be responsible for the installation of the shrouding required for balancing the the outer air registers. RJM will provide technical support on the installation. Testing will be conducted, most likely during the night shift, which would allow modifications for balancing to occur during the following day shift.

2.0 PERFORMANCE SPECIFICATIONS

2.1 All eight rows of six Babcock and Wilcox (B&W) dual register low NOx burners shall be balanced to within +/- 5.0% on a burner row basis.

2.2 Air flow testing will be conducted at normal secondary air flow through the windbox that is being tested.

3.0 CONDITIONS

3.1 The Contractor shall provide initial burner register positions for both the inner and outer vanes and inner register back plate position, prior to the beginning of the Outage. The burner registers will then be preset from the windbox at the beginning of the Outage, prior to testing.

The testing will be conducted with the burners in as close to final setup as possible to simulate actual operating conditions. This will include all register vane positioning, plus installation of the flame stabilizers.

3.2 Payment for testing completed is fixed price based on the baseline Air Distribution Analysis (ADA) test and a fixed price fee per burner for the air flow balancing testing.

3.3 IPSC will reserve the right to cancel additional testing and balancing due to time or other an foreseen event.

INTERMOUNTAIN POWER SERVICE CORPORATION

January 23, 1992

Bruce E. Blowey
Engineer of Generation
Los Angeles Department of Water & Power
P.O. Box 111, Rm. 1255E
Los Angeles, CA 90051

Dear Mr. Blowey:

Unit 1 Burner Modification Purchase Requisitions

Attached are purchase requisitions and documentation associated with the Unit 1 burner modifications to be implemented during the Spring 1992 Outage, scheduled to begin April 13, 1992. These alterations to the burners include the following requisitions:

1. Requisition 66498 - Fabrication of burner flame stabilizers. Cost of the flame stabilizers is \$2,100 per burner, for a total cost for 48 burners of \$100,800.
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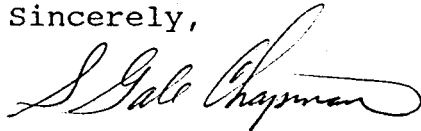
Total cost of these purchase requisitions is \$296,200 which will be funded from monies appropriated under IGS91-3, IPSC Budget page 8, line 4.

Mr. Bruce E. Blowey
Page 2
January 23, 1992

Your review and approval will be appreciated. Please return by February 17, 1992.

If there are any questions regarding this request, please contact Aaron Nissen or Jerry Hintze.

Sincerely,



S. Gale Chapman
President and Chief Operations Officer

¹⁰⁴
LBL:kkc
Attachments

cc: S. Gale Chapman w/o Attachments
Doug Ingraham w/o Attachments
Aaron Nissen w/o Attachments
Jerry Hintze w/o Attachments
Les Lovell w/o Attachments
File

IP7_000489

INTERMOUNTAIN POWER SERVICE CORPORATION

January 23, 1992

Bruce E. Blowey
Engineer of Generation
Los Angeles Department of Water & Power
P.O. Box 111, Rm. 1255E
Los Angeles, CA 90051

Dear Mr. Blowey:

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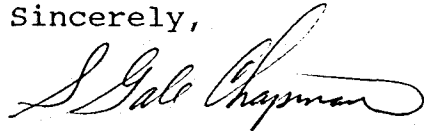
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Mr. Bruce E. Blowey
Page 2
January 23, 1992

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Sincerely,



S. Gale Chapman
President and Chief Operations Officer

jet
LBL:kkc
Attachments

cc: S. Gale Chapman w/o Attachments
Doug Ingraham w/o Attachments
Aaron Nissen w/o Attachments
Jerry Hintze w/o Attachments
Les Lovell w/o Attachments
File

IP7_000491

BURNER MODIFICATIONS- PRELIMINARY TEST RESULTS

1/23/92

Unit 2- Summary Burner Modifications:

Modifications (and their objectives) that were made to Unit 2's original B&W burners in the of Fall '91 are summarized below:

1. Installation of flame stabilizers in the inner zone on all 48 burners. Stabilizers were added to address burner overheat and mechanical deterioration. The objective was to significantly lower the maximum backplate temperature on the outer air registers.
2. Secondary air flow balancing through the burners was also conducted. Shrouding was added to the outer air registers to vary the restriction through each burner. Back plate settings were used to balance the inner air flows. The objective was to balance the inner and outer air flows through each burner to within +/- 5%. Perimeter loading around the burner (both inner and outer zones) was targeted for +/- 10%.
3. Burner register settings were changed to reduce the amount of overswirl in the outer air zone and to achieve an improved flame shape. The objective was to move the flame out away from the nozzle tip, reduce the occurrence of eyebrows and prevent recirculation of flue gases back into the burner.
4. Fuel flow balancing was also conducted which consisted of adding and changing coal line restrictors. Ten new restrictors were added and thirteen changes were made to orifice sizing on existing restrictors. These changes were made to improve fuel to air flow ratios in potentially rich or lean zones. The objective was to balance cold primary air flow to within +/- 3%.

Evaluation Restrictions:

The burner modifications made to Unit 2 are still being investigated and tested. Preliminary results are available, but a full test evaluation will not be completed for several months. An inspection evaluation won't be completed until the next available scheduled outage. Current restrictions on the evaluations are as follows:

1. Testing- Pulverizer 2H has not been available (since September 14, 1991) due to motor problems (rewound two times). Testing requires availability of all eight pulverizers, so that we can evaluate all eight combinations

of pulverizers at full load conditions. Evaluating all combinations allows us to evaluate worst case conditions. Without a spare motor, however, we must wait until H pulverizer motor becomes available.

2. Test Equipment- Not all the test equipment that has been ordered for AGASS testing, has been received. Some of the equipment that has been received, has had hardware problems.

3. Information- The RJM report, test results and recommendations based on the Air Distribution Analysis (ADA) has just been issued (received 1/24/92, a copy of the report is enclosed).

4. Manpower- Have more testing scheduled (reference schedule below) than available manpower. AGASS testing which is used to evaluate burner performance has been given the highest testing priority.

5. Unit 2 Outage- A scheduled maintenance outage is required on Unit 2 to evaluate the physical condition of the flame stabilizers. Earliest accurate inspections would be after six months of operation. A fireside inspection from the boiler platform will be required.

However, to implement any burner modifications on Unit 1's burners during the Spring '92 Outage, a decision must be made by the end of January 1992 to allow for fabrication and shipping of these components. Therefore, a preliminary evaluation of Unit 2's burner modifications has been conducted and is contained within.

Testing Schedule:

The current testing schedule on Unit 2 is as follows:

1. AGASS (automated gas analysis sampling system) testing for O₂, CO and NO_x levels is scheduled to begin February 3, 1992. AGASS testing will be used to determine distribution profiles at the economizer outlet. The schedule is awaiting pulverizer 2H and test rental equipment. After pulverizer 2H is back, Maintenance is requesting a week and half to get caught up on pulverizer inspections.

2. Clean Air Flow Testing is scheduled to determine how effective coal pipe restrictor changeouts have been and if additional changes are still needed.

3. **Cooling Air Flow Requirements Testing** is planned to determine optimum cooling air flow quantities across each burner row.

4. **Boiler Performance Testing (and Air Heater Testing)** with and without reduced cooling air flow requirements is also scheduled. An increase in boiler efficiency can be realized due to a reduction in cooling air requirements. Testing is scheduled to verify actual results.

5. **Pulverizer Fineness testing** (all pulverizers) is planned to correlate pulverizer condition with LOIs and performance.

PRELIMINARY TEST RESULTS- Unit 2 Burners

Preliminary test results on Unit 2 are based upon operational effects observed since the burner modifications have been implemented. Listed below are the factors used in the evaluation of these modifications:

1. Flame Shape and Pattern- Flame profiles are considerably improved and are quite different as compared to before the Outage and to flames on Unit 1. Flames have been pushed out 6" to 18" from the coal nozzle tip (burner front). Flame shapes are much more uniform with a good initial teardrop shape and bushy or flared tails.

Perimeter air loading around each individual burner, however, is still not uniform. There is severe flow distribution patterns picked up both by visual observations from the side ports and at the scanners, as well as by air flow balancing test results (reference RJM test report). This is an air flow distribution problem with the ductwork configuration.

2. Scanner Operation- Scanner adjustments as well as minor burner register setting adjustments were required after the outage to ensure flame stability (conducted during Turndown Testing immediately following the Outage).

Initial burner register settings were compromised to some degree to ensure that scanners saw flames at the scanner head location. The perimeter air loading problem needs to be resolved to eliminate this problem. Relocation of scanners to the outer zone should be considered to improve scanner performance.

3. NOx Levels- Indications on NOx levels are that there has been no appreciable change in emissions. This is based upon comparisons with before the Outage and on information on Unit 1. Additional detailed testing is required to evaluate more closely and to determine if there has been any overall improvements (comparison with a baseline).

Reference enclosed graphs showing Continuous Emissions Monitoring (CEM) NOx levels on both units over the last four months.

4. LOI Levels- Indications on LOI levels are that there has been no appreciable change. This is based upon comparisons with Unit 1 and from information gathered from before the Outage. Additional detailed testing is also required to evaluate more closely.

Monitoring will continue with Pozzolontic (fly ash sales contractor). Reference enclosed graphs showing fly ash LOI's on both units over the last four months.

5. Eyebrows- Unit 2's eyebrows are less severe than those on Unit 1's (based on operating time to date). Improved flame shapes seem to have helped this situation. However, due to some of the low ash fusion temperature coals, one would always expect some degree of eyebrows.

6. Burner Front Temperatures- An improvement of 100 F on maximum burner front temperatures has been realized in a typical configuration (based on Pulv 2H O/S). This maximum temperature reduction was the primary objective of the stabilizers and air flow balancing for out of service burners.

AGASS testing (controlled test conditions) will give more accurate detailed information on overall temperature improvements in all eight pulverizer configurations. Overheat temperature conditions are monitored at the outer air register backplates.

7. Cooling Air Flow Requirements- Converse to the burner front temperature reduction, windbox damper positions could be reduced by about 32% (from 51.0% to 18.9%, 2H pulv O/S). One would realize a reduction in cooling air flow requirements to a row of burners that are out of service (O/S).

Reducing windbox damper positions would reduce cooling air flow (which effectively acts like casing leakage) and puts the air requirements in the combustion zone where it is needed.

A compromise between a realistic maximum burner front temperature (1200 or 1250 F versus 1350 F) and acceptable cooling air flow requirements need to be worked out. This will require detailed testing and a controls modification for windbox damper positioning on each burner row.

8. Fuel flow balancing- Based upon station O2 instrumentation, oxygen profiles (deviation of O2 levels from probe to probe) across the eight economizer probes have been slightly improved. AGASS testing which looks at a 56 point grid at the same location as the station instrumentation will give much more accurate and detailed results.

Drum level which is direct indication of heat input from the burners, has also experienced an improvement. After unit startup, the three drum level transmitters (end, center, end) were much closer spaced in their level indication. Over time, however, furnace slagging and eyebrow formation plays a larger role in heat absorption and drum level deviations.

9. Secondary Air Flow Balancing- Testing completed during the end of the Fall '91 Outage, showed a 29% improvement in burner to burner balancing. Perimeter loading, however, around the burner shows severe imbalances. Reference enclosed RJM ADA Test Report and recommendations.

10. Boiler Performance- If cooling air flow requirements were reduced, an improvement in boiler performance could be realized. Additionally, with well balanced combustion (fuel and air flows), a reduction in excess air levels could be made which would also have significant positive impact on boiler efficiency.

11. Mechanical Integrity/Life of Stabilizer- The mechanical integrity of the flame stabilizer is undeterminable at this time. This item requires an outage for a fireside inspection to determine any mechanical problems with the stabilizer.

12. Life Extension of Burner- The flame stabilizer effects on the life extension of the burner itself is also undeterminable at this time. This item also requires an inspection to evaluate the actual impact on the burner integrity.

BURNER MODIFICATIONS

SUMMARY OF PROPOSED RECOMMENDATIONS:

UNIT 1 BURNERS-

1. New Designed Burners (48)
New burners are currently being fabricated by B&W
Installation is scheduled for the April 13, 1992 Outage
2. Flame Stabilizers-
Fabrication (RJM)
Recommended installation on Unit 1 (with mods)
IPSC will submit purchase requisition and specifications.
Budget Funding- IGS91-03, LADWP-PD&C has lead assignment.

Installation (B&W, T&B or others)
IPSC will submit purchase requisition and work scope for bid
3. Air Distribution and Balancing (RJM support)
IPSC will submit purchase requisition and specs.
Schedule four days of testing and balancing to end of outage (baseline test and three iterations).
4. Coal Pipe Restrictors
IPSC will submit PR and specs for fabrication
IPSC will submit PR and work scope for installation (B&W or T&B)
5. 3-D Modeling of Boiler Ductwork for Sec Air Flow Balancing
IPSC will submit PR and specs
RJM or B&W
6. Ductwork Modifications (based on results of 3-D modeling)
B&W or Outside Contractor

UNIT 2 BURNERS-

1. New Designed Burners (48)
Based upon evaluation of Unit 1's burners (min six month period with inspection outage)
Installation scheduled for ??
2. Ductwork Modifications (based on results of 3-D modeling)
3. Additional coal pipe restrictor changeouts

PROPOSED BURNER MODIFICATIONS ON UNIT 1:

The following modifications are proposed for the combustion system on Unit 1.

NOTE: Unit 1 will have newly designed and fabricated burners.

1. Flame Stabilizers-

a. Fabrication by RJM

b. Modifications to B&W's new burner design- Who (when, where) will cut off the inner air sleeve and lighter shroud plus attachment of the Flame Stabilizer to B&W's burner assembly.

Additional Modifications to Stabilizer:

c. New Swirl Number Calculation- RJM to calculate a new swirl design value based upon experience gained from Unit 2's burner.

d. New Inner Diameter Dimension- With new burners the inner diameter tolerance could be lowered.

e. Lighter Shroud Diameter Increase- Due to concerns with lighters drooping Unit 2's diameter should be enlarged.

f. Scanner Opening- There is a possibility of relocating the scanner opening into the outer zone (vs inner) for flame scanner improvements. This would eliminate the large inner zone opening. Consequences however, for the scanners not functioning properly (in all cases) in the outer zone would be serious. Would require outage and field cutouts of holes in inner zone (fireside picks).

2. Air Distribution Analysis (Baseline and Balancing)- Recommend baseline and balancing air flow testing to set shrouds and backplates positions to equalize air flow distributions through the burner.

3. Coal Pipe Restrictor Installation-

a. Retesting Unit 2- Scheduled

b. Modifying Unit 2 nozzles for Unit 1- In house or send out.

c. Installation IPSC or Contractor- IPSC Maintenance

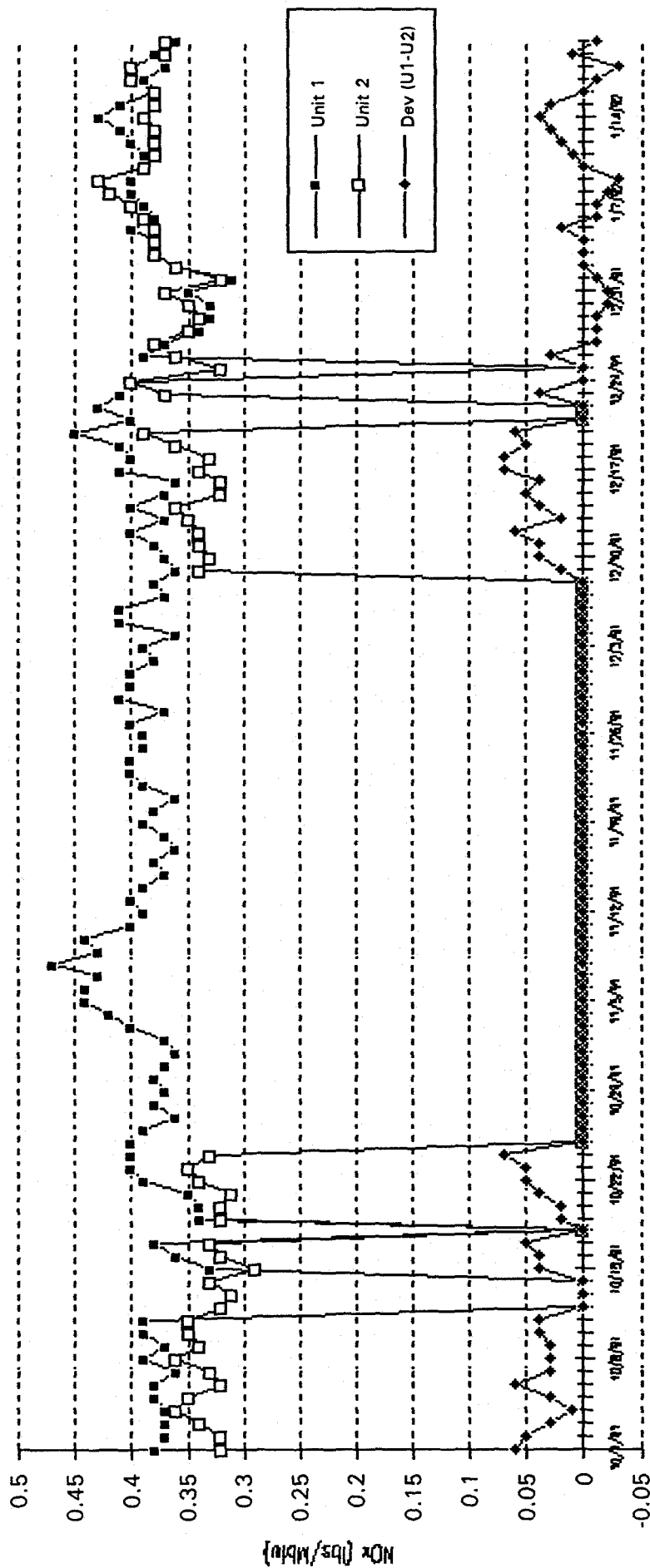
doesn't want to do installation because it would slow them down on pulverizer overhauls.

4. Three Dimensional Analysis- This analysis is required to address air distribution problems associated with secondary air duct configurations. The analysis is a mathematical model from the air heater outlet to furnace outlet.

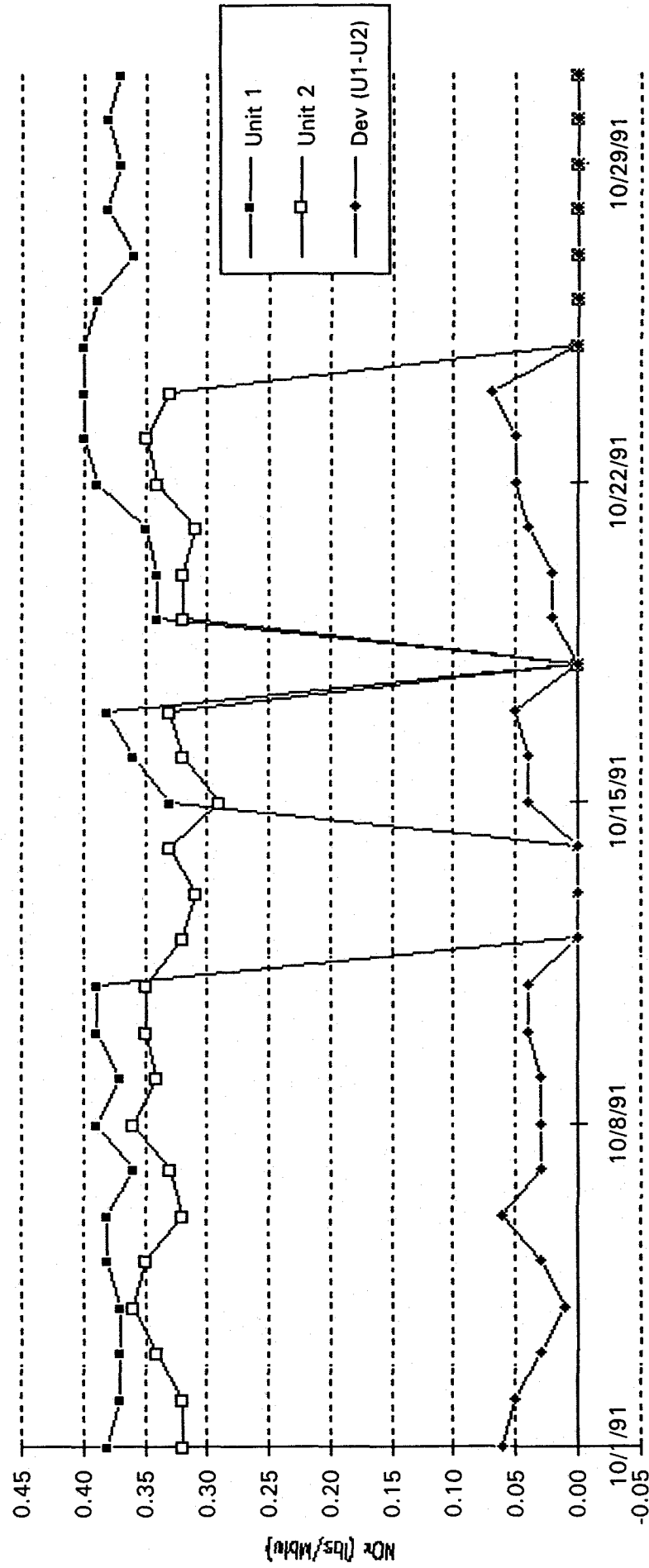
This item needs to be seriously considered. Please review RJM report and final recommendations. Note, this can also be justified in lieu on additional air flow monitoring instrumentation.

5. Ductwork Modifications- Air flow distribution problems can be corrected by straightening vanes, turning vanes, vortex breakers or other obstructions added to the ductwork. RJM would like to conduct a model to locate and size these items. B&W, however, states they can locate and install these without analysis (barnyard?).

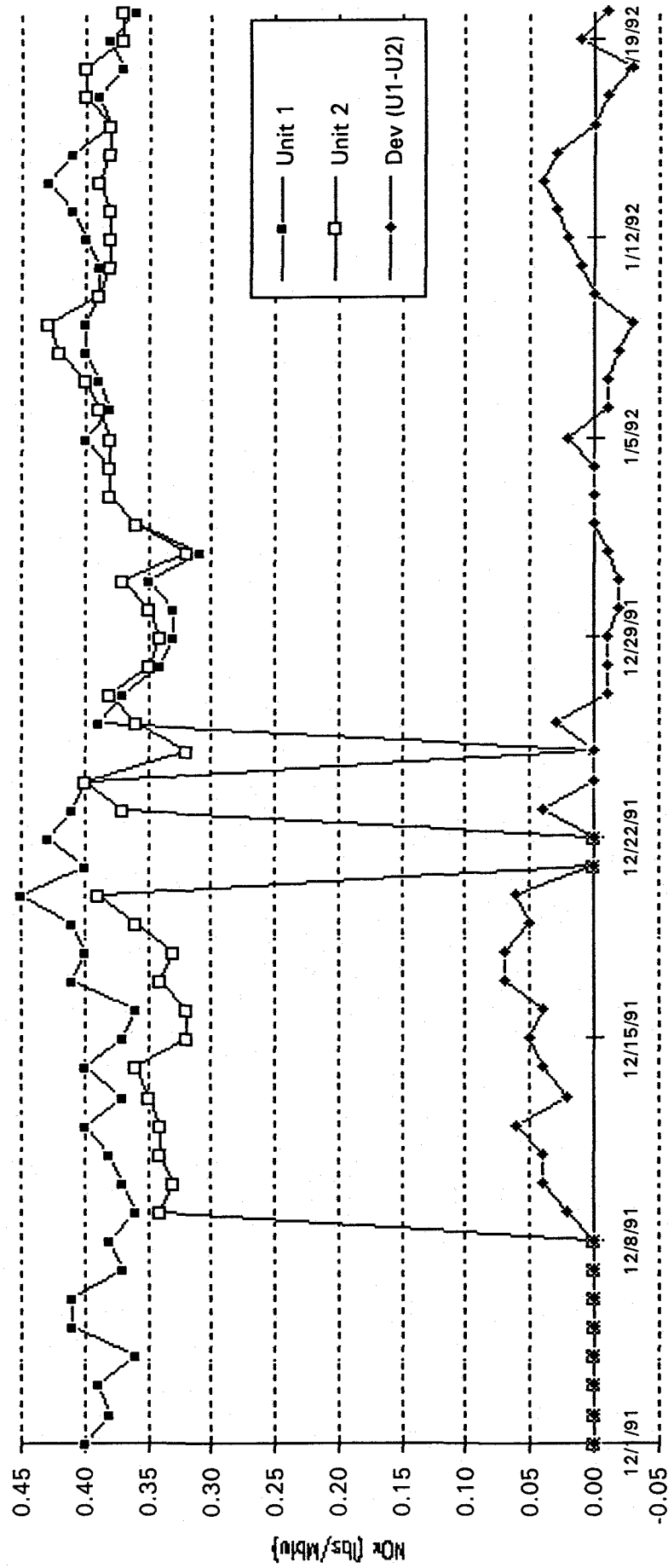
NOx TREND ANALYSIS



NOx TREND ANALYSIS (Before Outage)

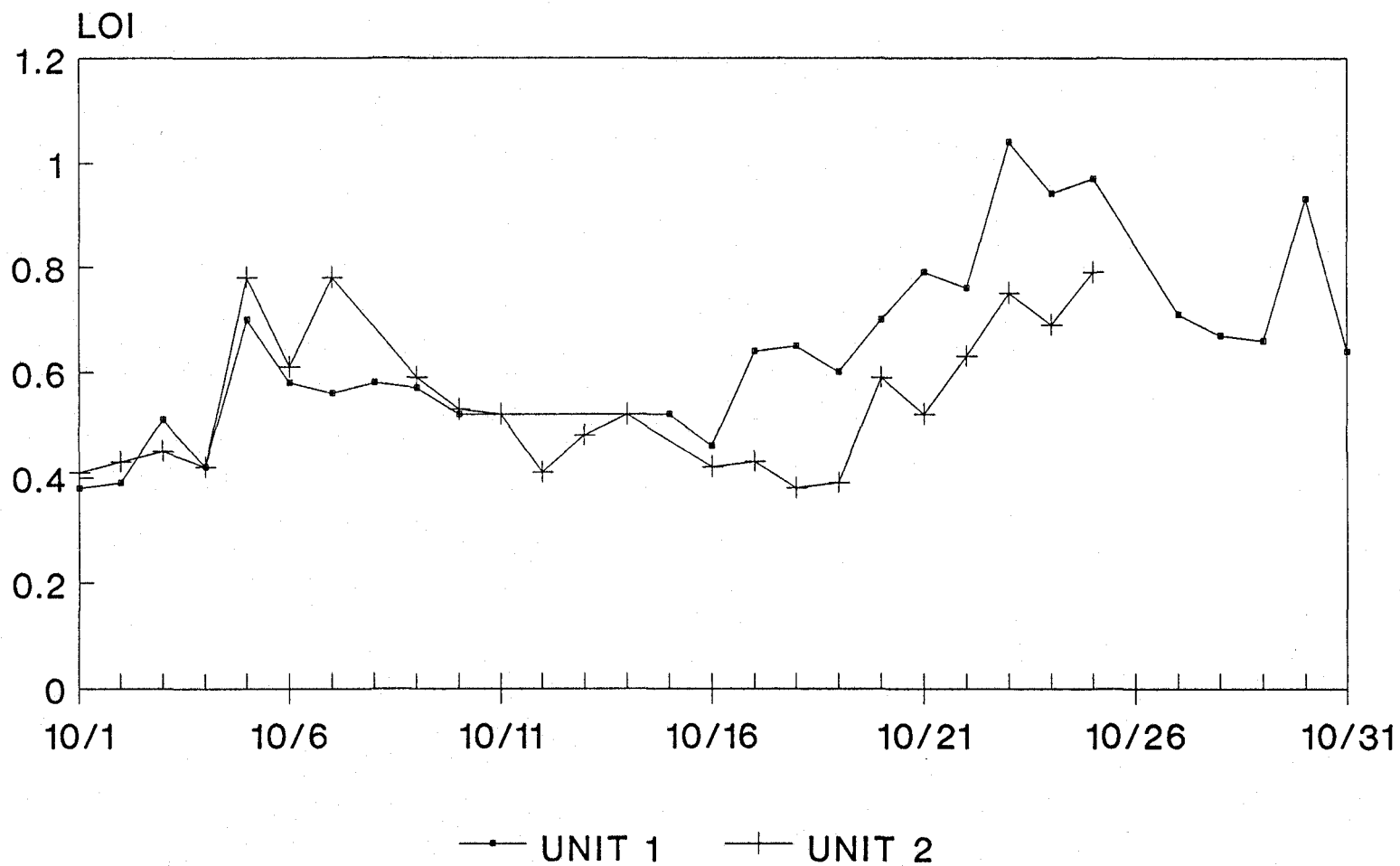


NOx TREND ANALYSIS (AFTER OUTAGE)



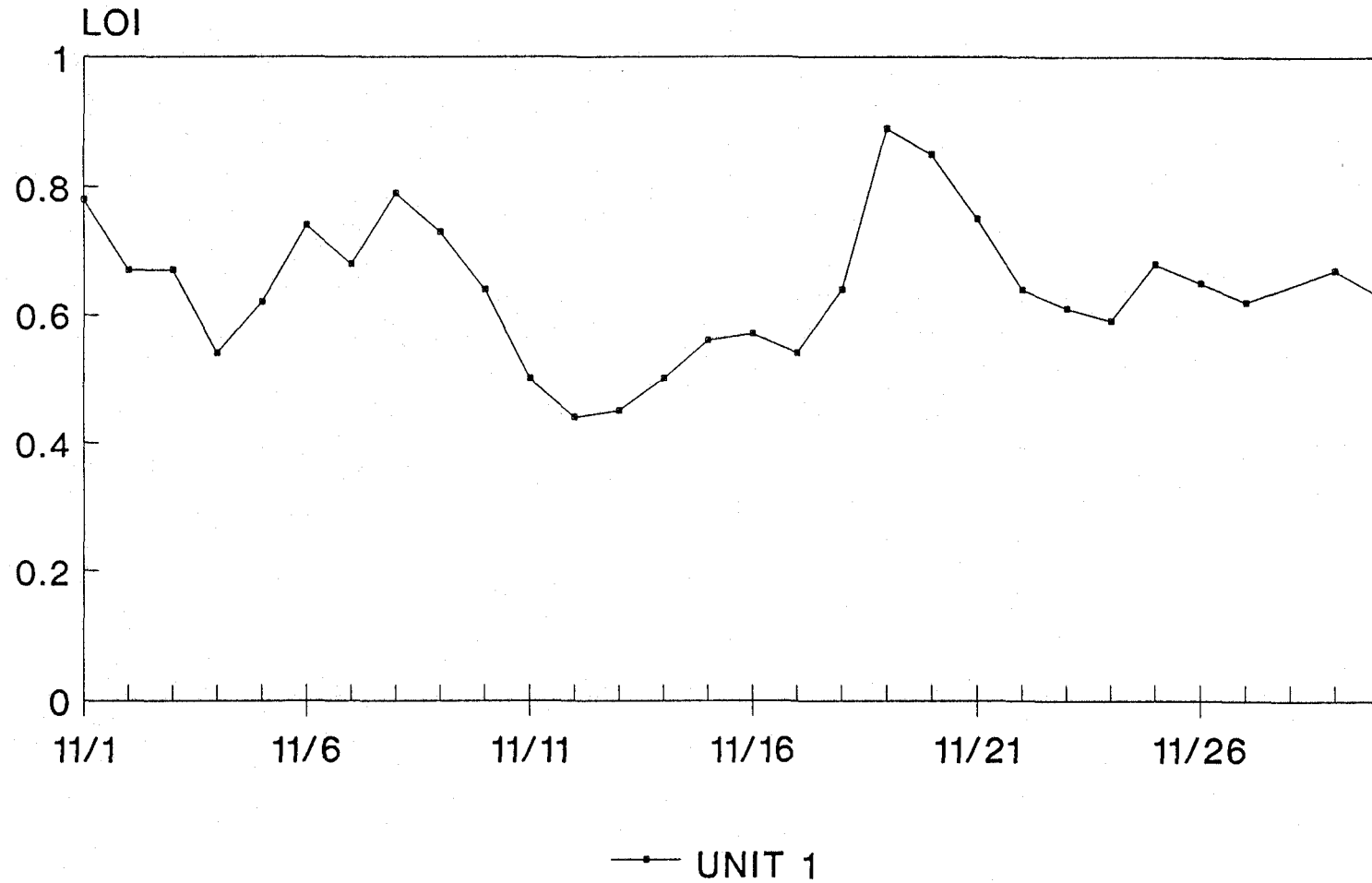
DELTA ASH LOI

TOTAL AVERAGES - OCTOBER 1991



DELTA ASH LOI

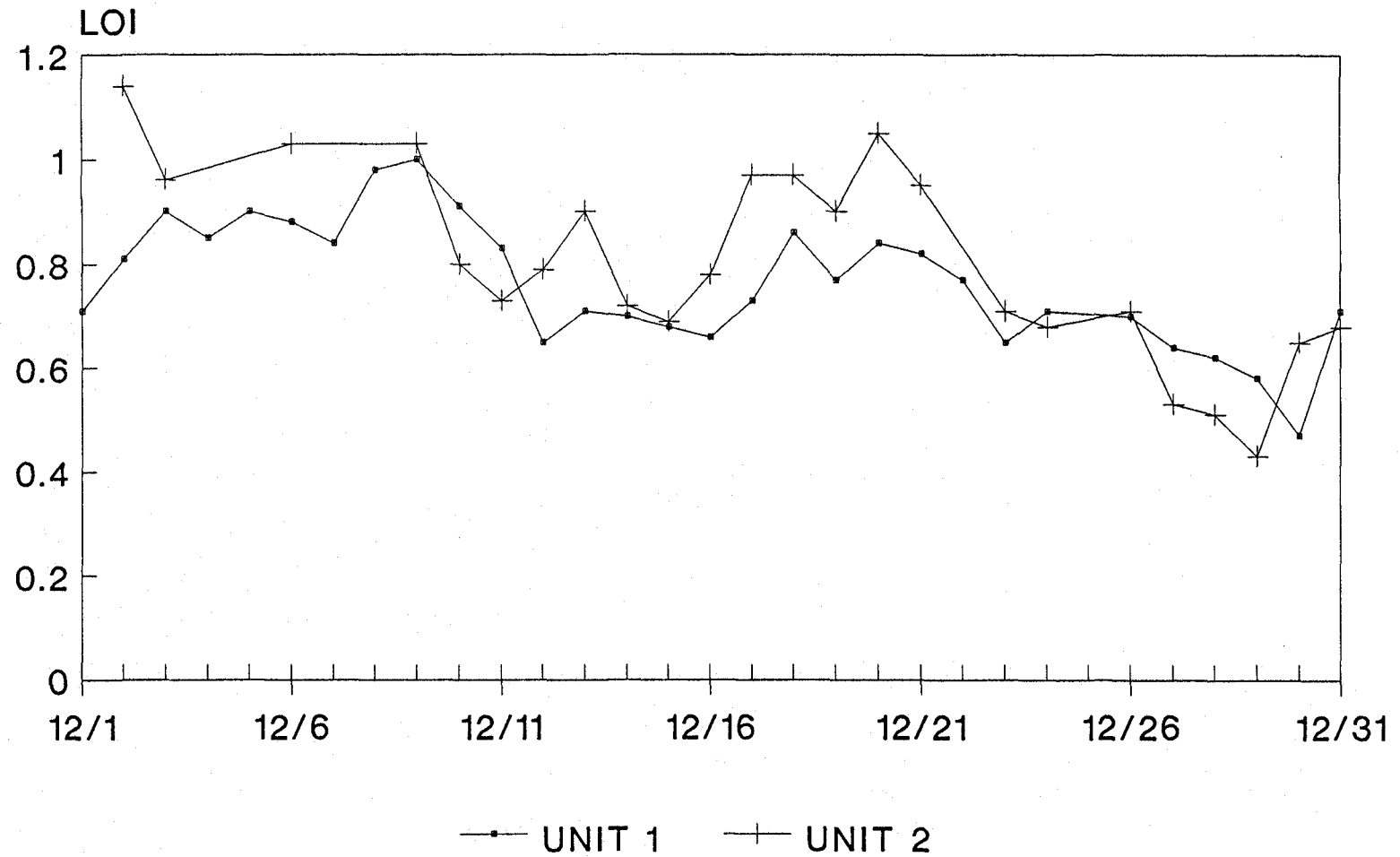
TOTAL AVERAGES - NOVEMBER 1991



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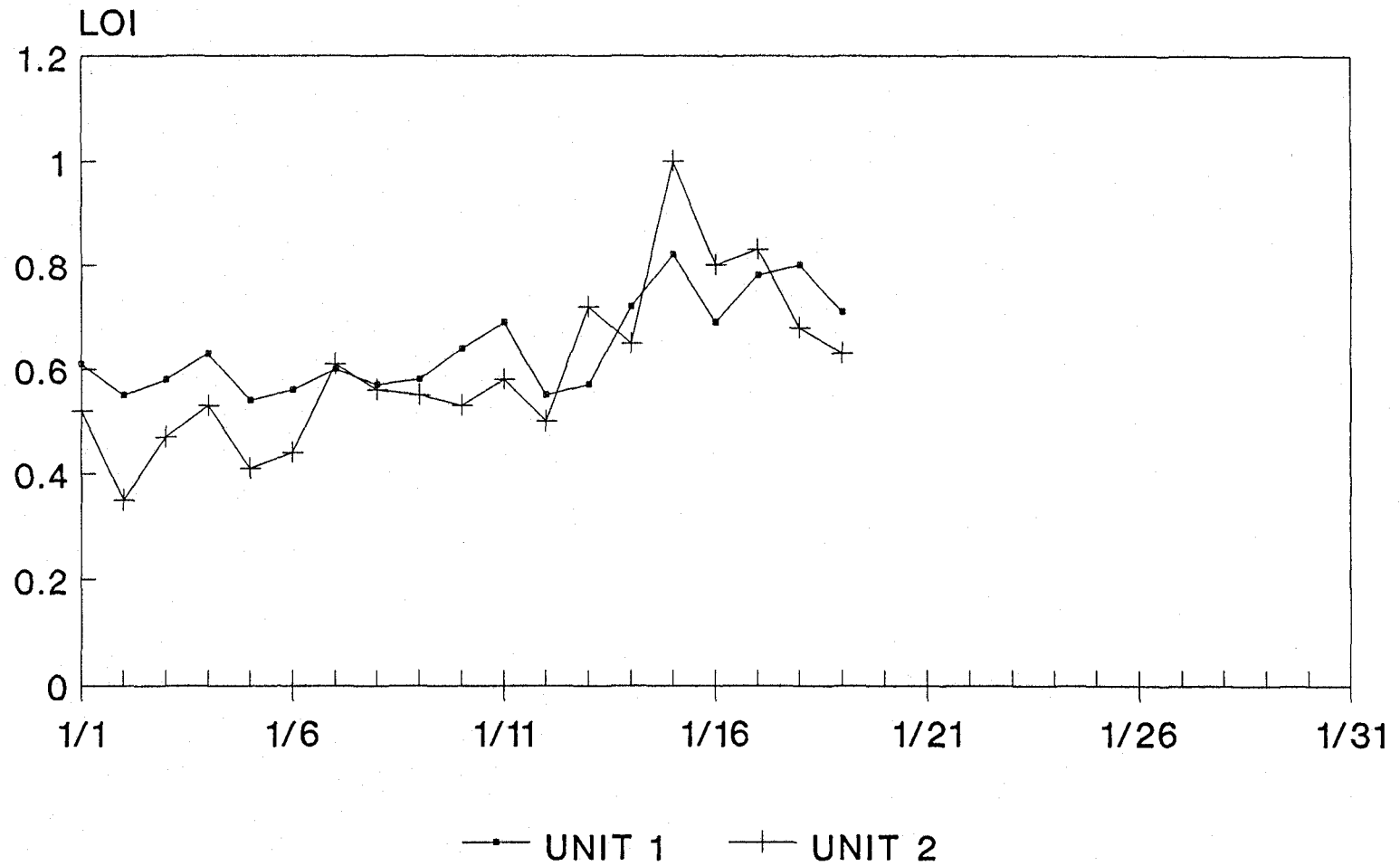
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TOTAL AVERAGES - DECEMBER 1991



DELTA ASH LOI

TOTAL AVERAGES - JANUARY 1992



IP7_000507

Burner Front Temperature Analysis (Based upon typical operating conditions)

IGS UNIT 2

1/24/92

Case 1: Before Flame Stabilizers

Case 2: After Flame Stabilizers

Average Operating Conditions:

Date:	10/16/91	12/10/91
Load (MWg)	842.2	840.6
7 mill operation, Pulv ?? out of service	2H	2H
Total Air Flow (%)	74.2	74.7
Excess Air (%)	3.42	3
Total Fuel Flow (TPH)	329.7	326.2
O/S Windbox Damper Position:	51	51

BURNER FRONT TEMPERATURES (F average)

	Burner Number					
H Burners O/S	1	2	3	4	5	6
W/O Stabilizers	1037	1066	1152	1291	1141	1066
W/ Stabilizers	955	1128	1079	1194	1140	1128

Maximum	Average
1291	1126
1194	1104
97	22

Overall Temp Improvement